

# PATENT SPECIFICATION

DRAWINGS ATTACHED.

826,975



*Date of filing Complete Specification : Oct. 21, 1957.*

*Application Date : July 21, 1956. No. 22644/56.*

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Index at Acceptance :—Classes 37, T ; and 38(1), E(3B2B : 31).

International Classification :—H02f. H04d.

## COMPLETE SPECIFICATION.

### Improvements in or relating to Aerial Coupling Devices.

PATENTS ACT, 1949

SPECIFICATION NO. 826,975

Reference has been directed, in pursuance of Section 8 of the Patents Act, 1949, to Specification No. 833,228.

THE PATENT OFFICE,  
31st October, 1960.

DS 81772/1(2)/8484 2CO 10/60 DL

15 an aerial lead of the co-axial cable type, one capacitor is serially connected with the cable screen and the other with the central conductor of the cable.

20 This type of coupling device should be protected against breakdown of the isolating capacitors which might occur due to the building up of a static charge in the aerial system and this may be effected by the provision of a suitably disposed resistor or resistors. In any case the device must not  
25 impair unduly the impedance matching between the aerial and the receiver to which it is coupled by the device.

30 For practical reasons the aerial coupling device should be small in size and be adapted for easy connection in the aerial lead.

35 A feature of the present invention is an aerial coupling device of the said type, in which the capacitors are located on one side of an insulating plate secured to a metallic sleeve, on the other side of which plate is a high-value resistor connecting a central conductor with the sleeve, the said metallic sleeve and central conductor being so shaped  
40 as to constitute outer and inner conductors respectively of a co-axial-type socket.

In the preferred form the said plate is in

aerial coupling device comprising a metallic sleeve, adapted to engage the outer conductor of a co-axial type plug, a high-value resistor in the form of a coating of resistance material deposited on one face of a plate of insulating material mounted within or adjacent the sleeve and in a plane normal to the axis of the sleeve, said resistor connecting the sleeve with a central conductor passing through the plate and having one end adapted to engage the central conductor of a coaxial type plug, two tubular capacitors coaxially mounted on the side of the plate remote from the resistance coating, the other end of said central conductor being connected to one plate of the inner capacitor, the sleeve being connected with a plate of the outer capacitor and means (for example tags) for connecting the other plates of said capacitors to appropriate parts of a television receiver. 60 65 70 75

The insulating plate is conveniently in the form of a disc mounted within the said sleeve.

In a modified form the aerial coupling device as above is arranged so that the insulating plate, together with its coating of resistance material, extends beyond the sleeve, the resistance material outside the 80

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## COMPLETE SPECIFICATION.

### Improvements in or relating to Aerial Coupling Devices.

We, EGEN ELECTRIC LIMITED of Charfleet Industrial Estate, Canvey Island, Essex, a British Company, and ALFRED BOWMAN of 10 Laburnum Grove, Canvey Island, Essex, a British Subject, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to aerial coupling devices of the type which comprises an assembly of two capacitors with connections such that when the device is connected in an aerial lead of the co-axial cable type, one capacitor is serially connected with the cable screen and the other with the central conductor of the cable.

20 This type of coupling device should be protected against breakdown of the isolating capacitors which might occur due to the building up of a static charge in the aerial system and this may be effected by the provision of a suitably disposed resistor or resistors. In any case the device must not

25 impair unduly the impedance matching between the aerial and the receiver to which it is coupled by the device.

30 For practical reasons the aerial coupling device should be small in size and be adapted for easy connection in the aerial lead.

35 A feature of the present invention is an aerial coupling device of the said type, in which the capacitors are located on one side of an insulating plate secured to a metallic sleeve, on the other side of which plate is a high-value resistor connecting a central conductor with the sleeve, the said metallic sleeve and central conductor being so shaped as to constitute outer and inner conductors respectively of a co-axial-type socket.

40 In the preferred form the said plate is in

the form of a disc housed within the sleeve and the said resistor is in the form of a further disc stamped out from thin sheet insulating material on one face of which is deposited a coating of resistance material, such for example as is used in the manufacture of resistance elements of volume control potentiometers for radio receivers. Alternatively, a single disc of insulating material may be employed, having the resistance material deposited on one face of the disc.

Another feature of the invention is an aerial coupling device comprising a metallic sleeve, adapted to engage the outer conductor of a co-axial type plug, a high-value resistor in the form of a coating of resistance material deposited on one face of a plate of insulating material mounted within or adjacent the sleeve and in a plane normal to the axis of the sleeve, said resistor connecting the sleeve with a central conductor passing through the plate and having one end adapted to engage the central conductor of a coaxial type plug, two tubular capacitors coaxially mounted on the side of the plate remote from the resistance coating, the other end of said central conductor being connected to one plate of the inner capacitor, the sleeve being connected with a plate of the outer capacitor and means (for example tags) for connecting the other plates of said capacitors to appropriate parts of a television receiver.

The insulating plate is conveniently in the form of a disc mounted within the said sleeve.

In a modified form the aerial coupling device as above is arranged so that the insulating plate, together with its coating of resistance material, extends beyond the sleeve, the resistance material outside the

sleeve forming a further high-value resistor adapted to be connected between the sleeve and earth to constitute a path for the discharge of any static charge in the aerial system to which the device is connected.

One embodiment of the invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of an aerial coupling device;

Figure 2 is a sectional side elevation of part thereof; and

Figure 3 is a side elevation of another part.

In the device shown in the drawings a generally tubular metallic sleeve is made up of a plug-receiving portion A, a flange B and an extension piece C. In Figure 2 the various parts are shown assembled together, but prior to the parts B and C being clamped together and secured, e.g. by spot welding the transverse portions thereof together. The gap shown in Figure 2 between parts B and C ensures that when they are secured together, a good electrical connection will be established between the various parts.

Housed within the metallic sleeve is a plate of insulating material in the form of a disc D, and two capacitors E, H are located on the left-hand side of disc D. On the right-hand side of disc D is a resistor in the form of a further disc J stamped from thin sheet insulating material on one face of which (the right-hand face in Figure 2) is deposited a coating of resistance material. This resistor is conveniently made from similar material to that employed when making the so-called "carbon tracks" for volume control potentiometers such as are commonly used in radio receivers, and may have an effective value of from  $\frac{1}{2}$  to 1 megohm from periphery to centre, so that this value of resistor is connected between the metallic sleeve (the left-hand end of part A being pressed against the periphery of the resistance coating, as shown at K) and a central conductor L which is located centrally with respect to the metallic sleeve by means of a locating disc M and passes through both discs J and D, extending within the inner tubular capacitor E. A shoulder on L engages the inner edge of the resistance coating and a firm connection is maintained by "staking" or burring the part N against a metal washer O.

The right-hand end of conductor L is slotted longitudinally (as indicated in Figure 2 by the absence of sectional hatching) to provide a small amount of resilience, and is shaped to receive the inner pin-like conductor of a coaxial type plug. The right-hand of part A of the sleeve is also slotted and flared slightly, and a split wire ring R encircles the slotted end. It will be seen that part A and the right-hand end of central

conductor L are shaped so as together to constitute respectively the outer and inner conductors of a coaxial type socket and thus are adapted to receive a co-operating coaxial type plug to facilitate coupling a coaxial cable type of aerial lead to the device. Parts B and C of the sleeve have transversely extending walls in which holes are formed to facilitate the mounting of the device on an insulating panel secured to a television receiver chassis.

Capacitors E and H are of the ceramic tubular type, in which the plates are in the form of silver coatings on the inner and outer walls of the tube. In each capacitor the outer plate (coating) extends towards the left-hand end of the tube and is spaced from the right-hand end of the tube, as indicated at OP in Figures 1 and 3. The inner plate (coating) of each capacitor extends towards the right-hand end and is spaced from the left-hand end of the tube, as indicated at IP in Figures 1 and 3, and in the case of the outer capacitor H, the inner plate coating extends to cover the annular right-hand end wall to enable the said inner plate to be electrically connected with part C of the sleeve by soldering, an annular fillet of solder being formed at S (Figure 2).

The left-hand end of the central conductor L is pre-tinned and soldered to the inner plate of capacitor E. The soldering is conveniently effected by R.F. heating.

Figure 3 shows the inner capacitor E in side elevation. A connecting tag in the form of a tinned copper wire pigtail T is soldered to the outer plate of the capacitor and serves as a means for making connection to the appropriate part of a television receiver via the inner conductor of a connecting lead of coaxial cable.

To the outer plate of capacitor H is soldered a ferrule U, the part V of which extends only half-way around pigtail T to leave access thereto and has integral tabs W extending further round the outer plate of capacitor H. The left-hand end of ferrule U is shaped so that it may be inserted between the outer screen and inner insulating material of a coaxial cable connecting lead. It is preferable to reinforce the electrical connection thus established by crimping an auxiliary metal sleeve X around that part of the cable screen beneath which the end of ferrule U is located.

After the soldering operations have been carried out, the capacitor plates are coated with a suitable protective paint or varnish.

Each capacitor may have a capacitance of 800 to 1800 picafarads (nominally 1000 pf) and should be capable of withstanding a high D.C. voltage.

The resistor forms a leakage path between the two capacitors, with the construction shown in the drawings it is necessary to pro-

vide a further leakage path from the coupling device to earth when the device is mounted on an insulating plate secured to the chassis of a television receiver. This may readily be effected by connecting a  $\frac{1}{2}$ -watt resistor of 1 to 3 megohm value between the transverse walls of parts B and C of the sleeve and earth.

Alternatively, the construction may be modified by substituting for the disc-shaped insulating plate D and resistor J within the sleeve an insulating plate of appropriate dimensions (and conveniently rectangular in shape) clamped between parts B and C of the sleeve, the plate being of suitable thickness for the sake of mechanical strength and having on its face remote from the capacitors a coating of resistance material deposited thereon and extending beyond the sleeve, so that the resistance material outside the sleeve forms the leakage path from the coupling device to earth when the device is mounted, by means of said insulating plate, on the chassis of a television receiver, the connection to earth being made near the edge of the resistance coating. The parts B and C of the sleeve must be electrically connected together and the part of the resistance coating within the sleeve constitutes the leakage path between the two capacitors in similar manner to the resistor shown in the drawings. Resistance values are preferably the same, for inner and outer resistors constituted by the plate and its coating, as mentioned earlier in the case of the illustrated device when connected to a television receiver chassis. The resistance coating on the plate should withstand peak mains voltage in the event of the aerial being earthed and also the voltages likely to occur due to the building up of a static charge in the aerial system.

Various other modifications may be made in construction without exceeding the scope of the invention. For example, in the embodiment illustrated, the insulating disc and the resistor may comprise a single disc with a resistance coating on one face, although this will not generally be so convenient to manufacture since it is desirable in that case for the disc to be relatively thick (as disc D, for example) for the sake of mechanical strength.

#### WHAT WE CLAIM IS:—

1. An aerial coupling device of the type to which this invention relates, in which the capacitors are located on one side of an insulating plate secured to a metallic sleeve, on the other side of which plate is a high-value resistor connecting a central conductor with the sleeve, the said metallic sleeve and central conductor being so shaped as to constitute outer and inner conductors respectively of a coaxial-type socket.

2. An aerial coupling device according

to Claim 1, in which the said plate is in the form of a disc housed within the sleeve and the said resistor is in the form of a coating of resistance material deposited on one face of the disc.

3. An aerial coupling device according to Claim 1, in which the said plate is in the form of a disc housed within the sleeve and the said resistor is in the form of a further disc stamped from thin sheet insulating material on one face of which is deposited a coating of resistance material.

4. An aerial coupling device according to any preceding claim, in which the two capacitors are tubular and are mounted coaxially, the said central conductor being connected to one plate of the inner capacitor and the said metallic sleeve being connected to one plate of the outer capacitor, and comprising means (for example tags) for connecting the other plates of said capacitors to appropriate parts of a television receiver.

5. An aerial coupling device comprising a metallic sleeve, adapted to engage the outer conductor of a coaxial-type plug, a high-value resistor in the form of a coating of resistance material deposited on one face of a plate of insulating material mounted within or adjacent the sleeve and in a plane normal to the axis of the sleeve, said resistor connecting the sleeve with a central conductor passing through the plate and having one end adapted to engage the central conductor of a coaxial-type plug, two tubular capacitors coaxially mounted on the side of the plate remote from the resistance coating, the other end of said central conductor being connected to one plate of the inner capacitor, the sleeve being connected with a plate of the outer capacitor, and means (for example tags) for connecting the other plates of said capacitors to appropriate parts of a television receiver.

6. An aerial coupling device according to Claim 4 or 5, in which said connecting means comprise a tag connected to the appropriate plate of the inner capacitor and adapted to be connected to the inner conductor of a connecting lead of coaxial cable, and an outer ferrule connected to the appropriate plate of the outer capacitor and adapted to be inserted between the cable screen and inner insulating material of such a connecting lead.

7. An aerial coupling device according to Claim 5, in which the insulating plate is in the form of a disc mounted within said sleeve.

8. An aerial coupling device according to Claim 5, in which the insulating plate, together with its coating of resistance material, extends beyond the sleeve, the resistance material outside the sleeve forming a further high-value resistor adapted to be connected between the sleeve and earth to

constitute a path for the discharge of any static charge in the aerial system to which the device is connected.

9. An aerial coupling device according to Claim 4 or 5, in which the said central conductor locates and supports the inner capacitor and in which said metallic sleeve, or an extension thereof, locates and supports the outer capacitor.

10. An aerial coupling device according to Claim 4 or 5, in which the capacitors are of the ceramic tubular type, the inner plate (coating) of each capacitor extending towards

the ends of the tubes near the resistor and being spaced from the other ends of the tubes, and the outer plate (coating) of each capacitor extending towards said other ends and being spaced from the ends near the resistor.

11. An aerial coupling device substantially as herein described with reference to the accompanying drawings.

ERNEST HEY,  
Chartered Patent Agent.

#### PROVISIONAL SPECIFICATION.

#### Improvements in or relating to Coupling Means for Television Receiving Aerials.

We, EGEN ELECTRIC LIMITED of Charfleet Industrial Estate, Canvey Island, Essex, a British Company, and ALFRED BOWMAN of 10 Laburnum Grove, Canvey Island, Essex, a British Subject, do hereby declare this invention to be described in the following statement:—

This invention relates to aerial isolators of the type which comprises a metal tubular casing housing two capacitors with connections such that when the isolator is connected in the aerial lead one capacitor is serially connected with the cable screen and the other with the central conductor.

This type of isolator should be protected against breakdown of the isolating capacitors which might occur due to the building up of a static charge in the aerial system and this may be effected by the provision of a suitably disposed resistor or resistors. In any case the aerial isolator must not impair unduly the impedance matching between the aerial and receiver.

For practical reasons the aerial isolator should be small in size and be adapted for easy connection in the aerial lead.

A feature of the present invention is an aerial isolator of the said type in which the capacitors are housed on one side of an insulating disc in a metallic sleeve, on the other side of which disc is a resistor connecting the central conductor with the sleeve.

In the preferred form the resistor is in the form of a deposit of resistance material on the insulating disc as for example as is used in volume control potentiometers as used in radio receivers.

Another feature of the invention is an aerial isolator comprising a metallic sleeve, a disc adapted to engage the screen of a coaxial cable aerial lead of insulating material within or adjacent the sleeve and in a plane normal to the axis of the sleeve a central

conductor passing through the disc and having one end adapted to connect the central wire of an aerial lead, two coaxial capacitors on the other side of the disc, the other end of said central conductor being connected to the inner plate of the inner capacitor, the sleeve being connected with a plate of the outer capacitor and means (for example tags) on the other plates of said capacitors for connecting to appropriate parts of the television receiver.

In a modified form the aerial isolator as above is arranged so that the resistor forms part of a coating of resistance material covering a panel which extends from the sleeve, the resistance material on the outside of the sleeve being adapted to be connected to earth and constitutes a path for the discharge of any static charge in the aerial system.

A still further feature of the invention is an aerial isolator comprising two capacitors and a panel coated with a resistance material which serves as a leakage path between the capacitors and also as a leakage path to ground.

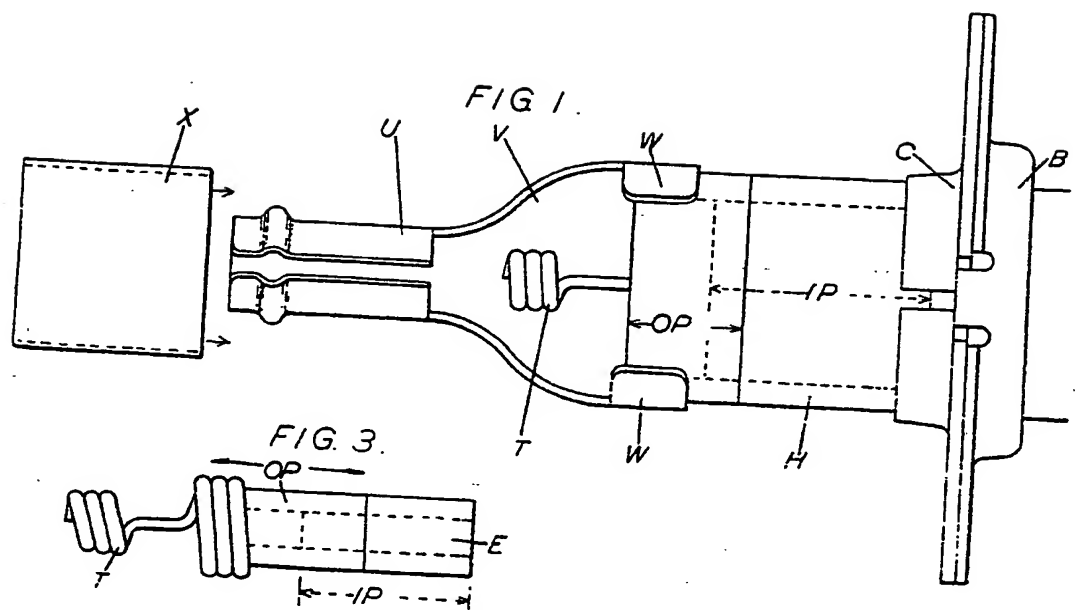
In a specific embodiment of the invention the isolator comprises a metallic sleeve whose internal dimensions are such as to engage and make contact with the outer conductor of an aerial terminal the sleeve housing a disc of insulating material in a plane normal to the axis of the sleeve, on one face of the disc there being deposited a resistance material, such for example as is used for making the so called carbon track of volume control potentiometers as used in radio receivers. This resistor makes contact with the sleeve and at the centre makes contact with a central conductor which passes through the disc, the end of the conductor within the sleeve having a suitable terminal, for example a socket adapted to be engaged by the central pin of the aerial plug. The sleeve has a flange extending outwardly in

the same plane as the disc, or parallel therewith, which serves as a means for fixing the isolator to the panel of a T.V. receiver. On the side of this flange remote from the sleeve is secured (preferably by spot welding) another flange formed from a sleeve which is connected to one plate of a first tubular condenser. Within this tubular condenser is situated a second tubular condenser, the condensers being spaced apart and preferably housing between them a body of insulating material to give rigidity to the construction. The inner condenser has one plate connected to the said central conductor and its other plate has a tag or the like for making rigid connection to the corresponding terminal in the radio receiver. The other plate of the outer capacitor has a similar tag or the like for connecting to the chassis of the receiver. By this construction the resistor forms a leakage path between the two capacitors. It is necessary however to provide a further leakage path from the isolator to ground or to the neutral terminal of the mains supply. This may be readily effected by connecting the leads, of say 3 meg ohms, to the flange of the metallic sleeve. This resistor should be capable of taking say half a watt.

In another embodiment the two flanges aforesaid are arranged to house between them an insulating panel of appropriate size to enable the panel to be mounted directly on a T.V. chassis. In this case one side of the panel is coated overall with a resistance material of the said kind, the resistance coating near the edge of the panel being connected to earth or chassis. In this way the resistance coating on the panel serves two purposes. Firstly it serves as a leak resistor between the capacitors (i.e. the part of the panel subtended by the metallic sleeve) and secondly it provides a leakage resistance connecting the aerial system to earth and adapted to withstand peak mains volts in the event of the aerial being earthed and also to withstand the voltages likely to occur due to the building up of a static charge in the aerial system.

The capacitors used are preferably of known type, in which the electrodes are coated on a ceramic tube, the respective electrodes not subtending one another, but being displaced to increase the leakage path between them.

ERNEST HEY,  
Chartered Patent Agent.

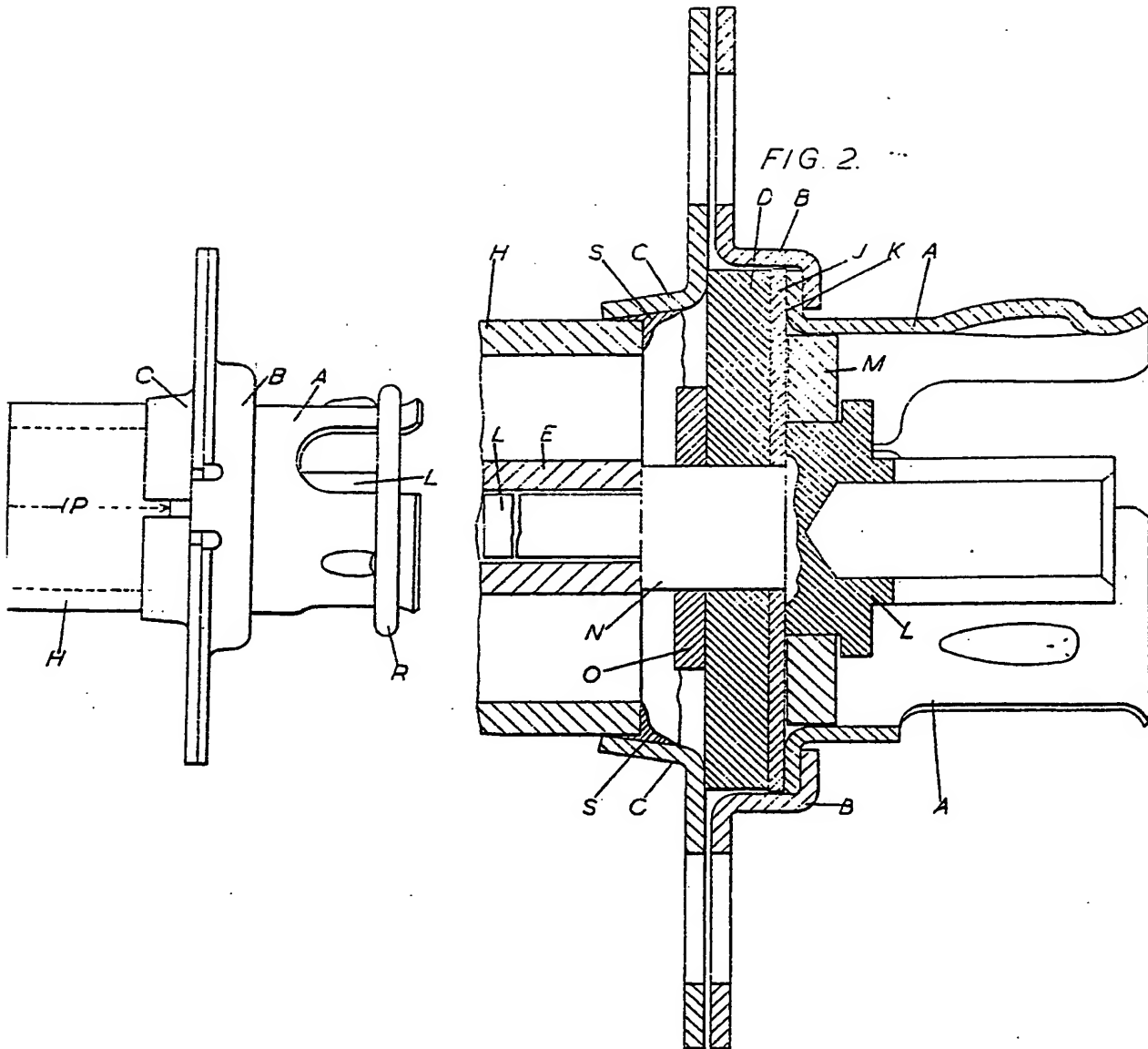


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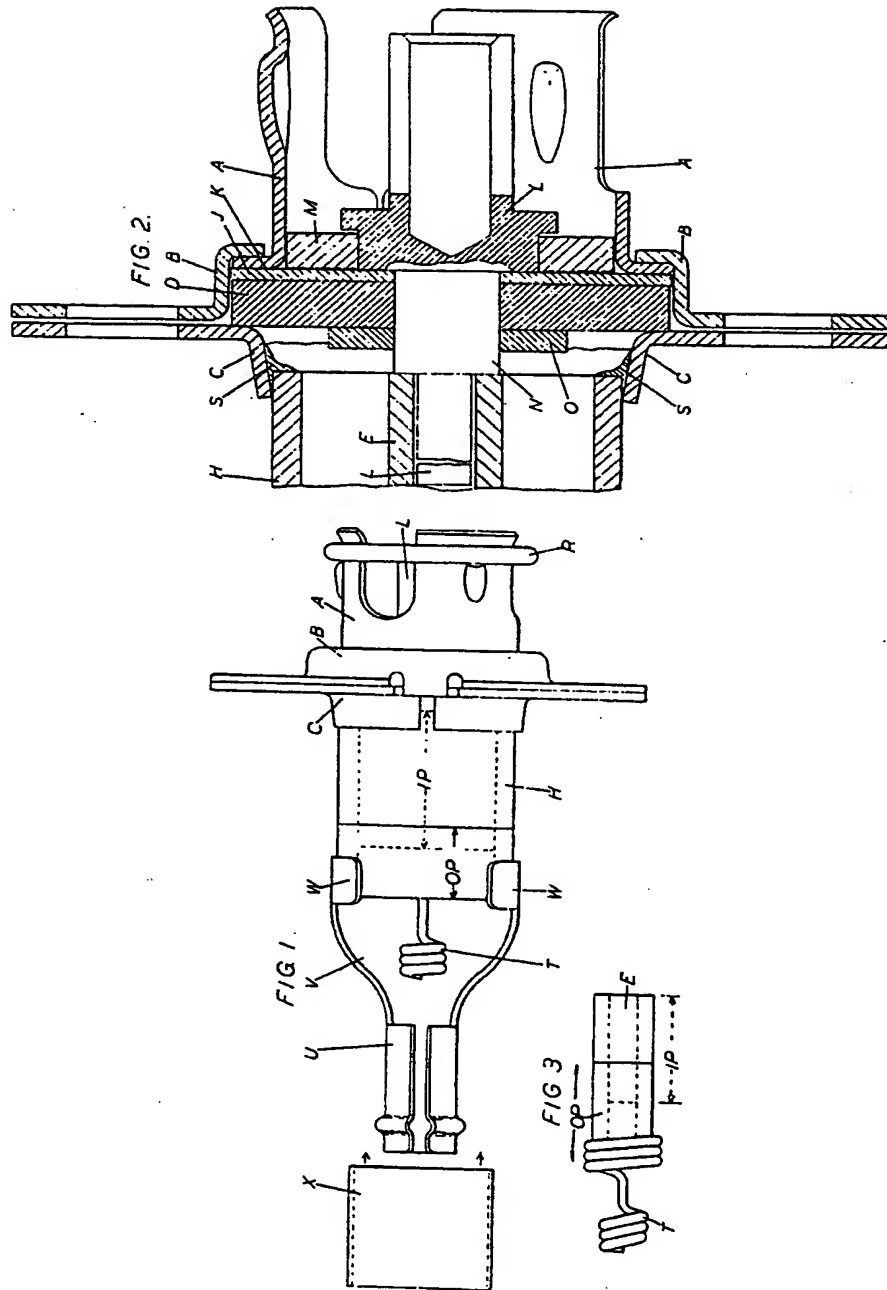
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